LA-UR-21-22997
Approved for public release; distribution is unlimited.

Title: LANL Environmental ALARA Program Status Report for CY 2020

Author(s): Bullock, Christine Anne
Chastenet de Gery, Mary Jo
Mcnaughton, Michael

Intended for: Report

Issued: 2021-03-29 (rev.1)

Los Alamos National Laboratory ALARA Program Status Report for CY 2020

LA-UR-21-22997

Bullock, Christine Anne
Chastenet de Gery, Mary Jo
Mcnaughton, Michael

March 2021

Los Alamos
NATIONAL LABORATORY

LANL Environmental ALARA Program Status Report for CY 2020

Introduction

Los Alamos National Laboratory (LANL) ensures that radiation exposures to members of the public and the environment from LANL operations, past and present, are below regulatory thresholds and are as low as reasonably achievable (ALARA) through compliance with Department of Energy (DOE) Order 458.1 *Radiation Protection for the Public and the Environment* (DOE 2020), and LANL Functional Series Documents EPC-ES-FSD-004, *Environmental Radiation Protection,* (LANL 2020a) and EPC-ES-FSD-003, *Los Alamos National Laboratory Environmental ALARA Program* (LANL 2020b). These documents provide related program authorities, responsibilities, descriptions, processes, and thresholds for conducting qualitative and quantitative ALARA analyses for prospective and actual radiation exposures to the public and to the environment resulting from DOE activities conducted on the LANL site.

The LANL document EPC-ES-FSD-003 also specifies requirements for reporting program status to the National Nuclear Security Administration (NNSA)/Los Alamos Field Office (LANL 2020b):

> "If the potential dose from a chosen ALARA alternative exceeds 10 mrem TED to any member of the public per year or a collective dose of 100 person-rem TED per year, the National Nuclear Security Administration (NNSA)/Los Alamos Field Office will be notified in writing."
>
> "In addition, a report summarizing the activities of the program is submitted to NNSA Los Alamos Field Office for the previous calendar year no later than the end of the first quarter of the following year. This report describes any changes to the Laboratory Environmental ALARA Program, including organizational structure, responsibilities, and authorities. Copies of all environmental ALARA records for the previous calendar year generated as a result of implementing the program are submitted to the NNSA/Los Alamos Field Office as an appendix to the report. These records include letters, determinations, and analysis reports."

The remainder of this report provides the information required by EPC-ES-FSD-003.

Exceedances of Potential Doses from ALARA Alternatives

During 2020, there were no potential doses in any alternative assessed that exceeded either: 1) 10 mrem TED to any member of the public per year, or, 2) a collective dose of 100 person-rem TED per year. Related, the reported annual dose to the Maximally Exposed Individual (MEI) in 2019 was 0.43 mrem while the collective population dose was 0.07 person-rem (LANL 2020c). Both of these doses are well within dose limits and ALARA considerations (LANL 2020b). Finally, environmental radiation doses to non-human biota were below the DOE limits in 2019 (LANL 2020c).

Summary of Environmental Radiation Protection ALARA Activities

Changes to the Program and Associated Documents

1) *Administration of Order 458.1*

The LANL ALARA program for public radiation exposure was implemented in 2011 and found to be in compliance with DOE Order 458.1, and with Change 3 (LANL 2020a, LANL 2020b). There were no changes made to the LANL Environmental ALARA program in 2020. The implementation of DOE Order 458.1 at LANL was assessed by DOE/NNSA in 2018, and the environmental radiation protection program was approved (Maggiore 2018). A management assessment of DOE Order 458.1, Change 4 was performed in 2020 (LANL 2021). The management assessment found zero (0) findings, four (4) Opportunities for Improvement, and four (4) Noteworthy Practices.

Implementation of Environmental ALARA

1) *Release of personal and real property to the public*

Land Transfer – There were no Land Conveyance and Transfer during 2020.

2) *Metal Recycling*

A total of about 475,000 pounds of metal were recycled in 2020. Approximately 50% of that amount was cleared through LANL's personal property release process for metal from LANL's LANSCE accelerator following the protocol in the Multi-Agency Radiation Survey and Assessment for Materials and Equipment (MARSAME) manual. The releases of these metals were independently reviewed by DOE prior to release for recycling. To expand LANL's ability to measure neutron activation in materials for use in waste segregation and personal property release under DOE Order 458.1, several studies were undertaken to explore measurement of neutron activation radionuclides in concrete and in bulk metal and concrete from LANSCE (Justus 2018, 2019). Using high purity germanium (HpGe) detectors to measure gamma emissions from dominant activation radionuclides, these studies showed that the minimum detectable activities of these radionuclides are below the ANSI 13.12 (ANSI 2013) 1 mrem/yr release criteria.

3) *Decommissioning and Demolition (D&D)*

A number of buildings and materials that were potentially radiologically impacted were surveyed using the MARSAME protocol prior to release. The criteria for public release of materials with residual radioactivity is residual radioactivity being indistinguishable from background. Sampling and Analysis Plans were developed, radiological sampling performed, and release reports were written for Buildings TA-3-016 (Ion Beam Facility), and TA-52-001 (UHTREX). Both buildings are currently in the demolition process. The D&D of TA-41-004 continues to be delayed due to needed improvements in the road used to access the building.

4) *Authorized Limits*

Screening Action Levels (SALs) and Authorized Limits (ALs), for radionuclides in soils are evaluated every year to determine if an update is needed. There was no need to update the SALs in 2020, and the Authorized Limits (ALs) for land transfer were also not updated (LANL 2016).

5) *Integrated Review Tool*

The Environmental Protection and Compliance Division, Environmental Stewardship Group (EPC-ES) Environmental Health Physics program reviewed numerous projects in 2020 through the Integrated Review Tool, which includes the Project Review and Requirements Identification tool (PRID) and the Excavation/Fill/Soil Disturbance tool (EXID). Through these tools, EPC-ES health physicists support LANL Air Quality (Rad-NESHAPs), Radiological Engineering design reviews for new facilities and facility modifications, and waste management reviews for disposition of materials such as soil, asphalt and concrete from areas that have possible LANL-derived radionuclides. Several projects were identified which had potential environmental and public dose implications. However, no projects resulted in individual or collective doses above the thresholds for formal ALARA review.

References

ANSI 2013. American National Standards Institute (ANSI), 2013. Surface and volume radioactivity standards for clearance. ANSI 13.12.

DOE, 2020. DOE Order 458.1, Change 4, *Radiation Protection for the Public and the Environment*

Justus, A, 2018. Technical Basis Document regarding high-resolution HPGe measurement of metals and other materials at LANSCE, RP-SVS-RIC-TBD-012.

Justus, A, 2019. Technical Basis Document regarding high-resolution HPGe measurement of concrete at LANSCE, RP-SVS-RIC-TBD-014.

LANL, 2016. Derivation of Authorized Limits for land transfer at Los Alamos National Laboratory. Los Alamos National Laboratory Report LA-UR-16-27038.

LANL, 2020a. Environmental Radiation Protection. Los Alamos National Laboratory Document EPC-ES-FSD-004.

LANL, 2020b. Los Alamos National Laboratory Environmental ALARA Program. Los Alamos National Laboratory Document EPC-ES-FSD-003.

LANL, 2020c. Los Alamos National Laboratory 2019 Annual Site Environmental Report. Los Alamos National Laboratory report LA-UR-20-26673.

LANL 2021. Environmental Radiation Protection Program, Los Alamos National Laboratory Document, LA-UR-21-20896

Maggiore 2018. Transmittal letter from P. Maggiore to A Martinez; Oct. 2018, MAI:8PM-2018-003115 regarding Laboratory report LA-UR-19-31308 Transmittal of DOE O 458.1 assessment report and approval of the Los Alamos National Laboratory Environmental Radiation Protection Program.